TOPIC:          193003
KNOWLEDGE:  K1.02   [2.4/2.5]
QID:            P1774   (N/A)

Two identical pressurizers are connected to the same location on two identical reactor coolant systems operating at 1000 psia.  Pressurizer A volume contains 50% saturated water and 50% saturated steam.  Pressurizer B volume contains 50% subcooled water (300°F) and 50% nitrogen.

Which one of the following explains which pressurizer will maintain the highest pressure following a sudden 10% liquid outsurge from each pressurizer?

A.  Pressurizer A due to vaporizing of saturated water as pressure begins to decrease

B.  Pressurizer A due to the expansion characteristics of saturated steam being better than the expansion characteristics of nitrogen

C.  Pressurizer B due to the subcooled water resulting in a smaller amount of energy being lost upon the outsurge

D.  Pressurizer B due to the expansion characteristics of nitrogen being better than the expansion characteristics of saturated steam

ANSWER:  A.

TOPIC:          193003
KNOWLEDGE:  K1.02   [2.4/2.5]
QID:             P1973   (N/A)

Two identical pressurizers are connected to the same location on two identical reactor coolant systems operating at 1000 psia.  Pressurizer A volume contains 50% subcooled water (300°F) and 50% nitrogen.  Pressurizer B volume contains 50% saturated water and 50% saturated steam.

Which one of the following explains which pressurizer will maintain the highest pressure during a sudden 10% liquid outsurge from each pressurizer?

A.  Pressurizer A due to the subcooled water resulting in a smaller amount of energy being lost during the outsurge.

B.  Pressurizer A due to the expansion characteristics of nitrogen being better than the expansion characteristics of saturated steam.

C.  Pressurizer B due to vaporizing of saturated water as pressure begins to decrease.

D.  Pressurizer B due to the expansion characteristics of saturated steam being better than the expansion characteristics of nitrogen.

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:   K1.02   [2.4/2.5]
QID:            P3874

A reactor is operating normally at 100% power.  Reactor coolant enters the reactor vessel at a temperature of 556°F and a total flow rate of 320,000 gpm.  The reactor coolant leaves the reactor vessel at 612°F.

What is the approximate flow rate of the reactor coolant leaving the reactor vessel?

A.  320,000 gpm

B.  331,000 gpm

C.  342,000 gpm

D.  353,000 gpm

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:  K1.08  [2.8/2.8]
QID:            P674    (B1074)

A liquid is saturated with 0% quality.  Assuming pressure remains constant, the addition of a small amount of heat will...

A.  raise the liquid temperature above the boiling point.

B.  result in a subcooled liquid.

C.  result in vaporization of the liquid.

D.  result in a superheated liquid.

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:  K1.08  [2.8/2.8]
QID:            P774    (N/A)

A pressurizer is operating in a saturated condition at 636°F.  If a sudden pressurizer level decrease of 10% occurs, pressurizer pressure will _____ and pressurizer temperature will _____.

A.  remain the same; decrease

B.  remain the same; remain the same

C.  decrease; decrease

D.  decrease; remain the same

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P874    (B875)

Consider a water/steam mixture with a current quality of 99%.  If pressure remains constant and heat is removed from the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____.   (Assume the mixture remains saturated.)

A.  decrease; remain the same

B.  decrease; decrease

C.  remain the same; remain the same

D.  remain the same; decrease

ANSWER:  D.


TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1075

A nuclear power plant is shut down with the pressurizer conditions as follows:

Pressurizer liquid temperature    $= 588°F$
Pressurizer vapor temperature     $= 607°F$
Pressurizer pressure              $= 1410$ psia

If the pressurizer is vented until pressure equals 1200 psia, pressurizer liquid temperature will...

A.  increase due to condensation of vapor.

B.  increase due to evaporation of liquid.

C.  decrease due to condensation of vapor.

D.  decrease due to evaporation of liquid.

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1174

Which one of the following describes the temperature of a saturated liquid?

A.  Below the boiling point

B.  At the boiling point

C.  Above the boiling point

D.  Unrelated to the boiling point

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1374   (B1874)

Consider a water/steam mixture with a current quality of 95%.  If pressure remains constant and heat is added to the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____.   (Assume the mixture remains saturated.)

A.  increase; remain the same

B.  increase; increase

C.  remain the same; remain the same

D.  remain the same; increase

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:            P1474  (B1974)

If 1 pound-mass of liquid water is in a saturated condition at a constant pressure, the addition of 1 Btu will...

A.  raise the temperature of the water by 1°F.

B.  vaporize a portion of the water.

C.  increase the density of the water.

D.  result in 1°F of superheat.

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:            P1574  (B1574)

Consider a steam-water mixture with a current quality of 79%.  If pressure remains constant and heat is added to the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____.   (Assume the mixture remains saturated.)

A.  increase; increase

B.  increase; remain the same

C.  remain the same; increase

D.  remain the same; remain the same

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1575

A nuclear power plant is shut down with the pressurizer in a saturated condition as follows:

    Pressurizer liquid temperature    = 588°F
    Pressurizer vapor temperature     = 588°F
    Pressurizer pressure              = 1410 psia

Pressurizer spray is initiated to lower pressurizer pressure to 1350 psia.  When pressurizer pressure stabilizes at 1350 psia, liquid temperature will be _____ and vapor temperature will be _____.

A.  the same; the same

B.  the same; lower

C.  lower; the same

D.  lower; lower

ANSWER:  D.


TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1974   (B3574)

A steam-water mixture is initially saturated with a quality of 50%, when a small amount of heat is added.  Assuming pressure remains constant and the mixture remains saturated, mixture steam quality will _____ and mixture temperature will _____.

A.  increase; increase

B.  increase; remain the same

C.  remain the same; increase

D.  remain the same; remain the same

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:            P1976  (B2874)

Which one of the following is the approximate steam quality of a steam-water mixture at 467°F with an enthalpy of 1000 BTU/lbm?

A.  25%

B.  27%

C.  73%

D.  75%

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:              P2174

Consider a pressurizer containing a saturated water/steam mixture at 636°F with a quality of 50%.  If an outsurge removes 10% of the liquid volume from the pressurizer, the temperature of the mixture will _____ and the quality of the mixture will _____.  (Assume the mixture remains saturated.)

A.  decrease; decrease

B.  decrease; increase

C.  remain the same; decrease

D.  remain the same; increase

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:              P2374   (B2375)

Which one of the following describes the effect of removing heat from a steam-water mixture that is in a saturated condition?  (Assume the mixture remains saturated.)

A.  Temperature will increase.

B.  Temperature will decrease.

C.  Quality will increase.

D.  Quality will decrease.

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:            P2474

A nuclear power plant is shut down with the pressurizer in a saturated condition as follows:

    Pressurizer liquid temperature   = 588°F
    Pressurizer vapor temperature    = 588°F
    Pressurizer pressure             = 1410 psia

Pressurizer heaters are energized to raise pressurizer pressure to 1450 psia.  When pressurizer pressure stabilizes at 1450 psia, liquid temperature will be _____ and vapor temperature will be _____.

A.  the same; the same

B.  the same; higher

C.  higher; the same

D.  higher; higher

ANSWER:  D.


TOPIC:          193003
KNOWLEDGE:   K1.08   [2.8/2.8]
QID:            P2874   (B3374)

An open container holds one pound-mass of liquid water at saturated conditions and atmospheric pressure.  The addition of 4 Btus will...

A.  raise the temperature of the water by 4°F.

B.  vaporize a portion of the water.

C.  increase the density of the water.

D.  result in 4°F of superheat.

ANSWER:  B.

TOPIC:            193003
KNOWLEDGE:  K1.08   [2.8/2.8]
QID:              P2974   (B2975)

Consider a pressurizer containing a saturated water/vapor mixture at 500°F.  The mixture is currently stable with no net heat gain or loss occurring.  Water and steam each occupy 50% of the pressurizer volume.

If a leak near the bottom of the pressurizer results in a loss of 10% of the liquid volume from the pressurizer, the temperature of the mixture will _____, and the overall quality of the mixture will _____.  (Assume the mixture remains saturated.)

A.  decrease; increase

B.  decrease; decrease

C.  remain the same; increase

D.  remain the same; decrease

ANSWER:  A.

TOPIC:          193003
KNOWLEDGE:   K1.12   [2.8/2.3]
QID:            P3375  (B3378)

Given the following:

• A saturated steam-water mixture with an inlet quality of 60% is flowing through a moisture separator.
• The moisture separator is 100% efficient for removing moisture.

How much <u>moisture</u> will be removed by the moisture separator from 50 lbm of the steam-water mixture?

A.  10 lbm

B.  20 lbm

C.  30 lbm

D.  40 lbm

ANSWER:  B.

TOPIC: 193003
KNOWLEDGE: K1.12 [2.8/2.3]
QID: P3774 (B3778)

Given the following:

• A saturated steam-water mixture with an inlet quality of 40% is flowing through a moisture separator.
• The moisture separator is 100% efficient for removing water.

How much water will be removed by the moisture separator from 50 lbm of the steam-water mixture?

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

ANSWER: C.

TOPIC:          193003
KNOWLEDGE:   K1.14   [2.4/2.5]
QID:            P574

Any vapor having a temperature above saturation temperature is a...

A.  saturated vapor.

B.  superheated vapor.

C.  dry saturated vapor.

D.  wet saturated vapor.

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:   K1.14   [2.4/2.5]
QID:            P974

A nuclear power plant is shut down with the pressurizer in a saturated condition with liquid and vapor temperatures at 650°F.  After a reactor coolant system cooldown, pressurizer conditions are as follows:

    Pressurizer liquid temperature     = 588°F
    Pressurizer vapor temperature      = 607°F
    Pressurizer pressure               = 1410 psia

Given these conditions, the pressurizer liquid is _____ and the pressurizer vapor is _____.

A.  subcooled; saturated

B.  subcooled; superheated

C.  saturated; saturated

D.  saturated; superheated

ANSWER:  D.

TOPIC:            193003
KNOWLEDGE:   K1.14   [2.4/2.5]
QID:              P1674

A reactor trip occurred 10 minutes ago due to a loss of coolant accident.  Emergency coolant injection is in progress and pressurizer level is increasing.  Current pressurizer conditions are as follows:

    Pressurizer liquid temperature    = 540°F
    Pressurizer vapor temperature    = 607°F
    Pressurizer pressure                   = 1410 psia
    Pressurizer level                       = 60%

Given these conditions, the pressurizer liquid is _____ and the pressurizer vapor is _____.

A.  saturated; saturated

B.  saturated; superheated

C.  subcooled; saturated

D.  subcooled; superheated

ANSWER:  D.

TOPIC:　　　　193003
KNOWLEDGE:　K1.14　[2.4/2.5]
QID:　　　　　P2074　(B2074)

Consider a saturated water/steam mixture at 500°F with a quality of 90%.  If the pressure of the mixture is decreased with no heat gain or loss, the temperature of the mixture will _____ and the quality of the mixture will _____.  (Assume the mixture remains saturated.)

A.  decrease; decrease

B.  decrease; increase

C.  remain the same; decrease

D.  remain the same; increase

ANSWER:  B.

TOPIC:　　　　193003
KNOWLEDGE:　K1.16　[2.6/2.7]
QID:　　　　　P2975　(B2973)

An open vessel contains one pound-mass of water at 206°F and atmospheric pressure.  Which one of the following will be caused by the addition of 3 Btu to the water?

A.  The water temperature will rise by 3°F.

B.  3% of the water mass will vaporize.

C.  The water density will decrease by 3%.

D.  The water will become superheated by 3°F.

ANSWER: A.

TOPIC:          193003
KNOWLEDGE:   K1.17   [3.0/3.2]
QID:             P575

A reactor is shut down with reactor coolant system (RCS) pressure at 1500 psia and core decay heat is being removed by the steam generators (S/Gs).  What pressure must be maintained in the S/Gs to obtain a 110°F subcooling margin in the RCS loop cold legs? (Assume a negligible temperature difference between the RCS and the S/Gs.)

A.  580 psia

B.  600 psia

C.  620 psia

D.  640 psia

ANSWER:  B.


TOPIC:          193003
KNOWLEDGE:   K1.17   [3.0/3.2]
QID:             P675

Which one of the following steam generator (S/G) pressures will come closest to producing a 50°F reactor coolant system (RCS) subcooling margin with RCS pressure at 1000 psia? (Assume a negligible delta-T across the S/G tubes.)

A.  550 psia

B.  600 psia

C.  650 psia

D.  700 psia

ANSWER:  C.

TOPIC:         193003
KNOWLEDGE:  K1.17  [3.0/3.2]
QID:           P775

Which one of the following changes will result in <u>increased</u> subcooling of the condensate water in the condenser hotwell?

A.  Isolate one bay of the condenser circulating water system

B.  Increase circulating water temperature

C.  Decrease circulating water flow

D.  Decrease the main turbine steam flow rate

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:   K1.24   [2.8/3.1]
QID:           P1475

A nuclear power plant has been operating at 100% power (3400 MWt) for six months when a main steamline break results in a reactor trip.  The break is isolated and all steam generators (S/Gs) stop depressurizing at 700 psia.  The reactor coolant system (RCS) cooldown stops at 503°F and a heatup begins.  Current plant conditions are as follows:

Total mass of water in the RCS and S/Gs:    800,000 lbm
Specific heat of RCS and S/G feedwater:     1.2 Btu/lbm-°F
Reactor coolant pump heat input to RCS:     15 MWt
Decay heat generation rate:                 3%
RCS pressure:                               1600 psia
Feedwater flow to S/Gs:                     Isolated

The above parameters do not change once the break is isolated.  The RCS and S/Gs remain in thermal equilibrium during the heatup.  The S/Gs remain saturated and the only S/G heat removal path is via the safety valve.

Approximately how long from break isolation will it take for S/G pressure to reach the safety valve setpoint of 1100 psia?

A.  2 minutes

B.  8 minutes

C.  16 minutes

D.  30 minutes

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:  K1.24  [2.8/3.1]
QID:            P1675  (B1175)

Which one of the following is the approximate temperature of a water-steam mixture that has an enthalpy of 1150 Btu/lbm and a quality of 95%?

A.  220°F

B.  270°F

C.  360°F

D.  410°F

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:  K1.25  [3.3/3.4]
QID:            P75

Which one of the following is the reactor coolant system subcooling margin when reactor coolant temperature is 280°F and pressurizer pressure is 400 psig?

A.  165°F

B.  168°F

C.  265°F

D.  268°F

ANSWER:  B.

TOPIC: 193003
KNOWLEDGE: K1.25 [3.3/3.4]
QID: P141

Given the following reactor coolant system (RCS) parameters, determine the RCS subcooling margin.

    RCS pressure           = 2235 psig
    RCS hot leg temperature  = 610°F

A. 25°F

B. 31°F

C. 38°F

D. 43°F

ANSWER: D.


TOPIC: 193003
KNOWLEDGE: K1.25 [3.3/3.4]
QID: P275 (B275)

The saturation pressure for water at 328°F is...

A. 85 psig.

B. 100 psig.

C. 115 psig.

D. 130 psig.

ANSWER: A.

TOPIC:          193003
KNOWLEDGE:  K1.25   [3.3/3.4]
QID:             P376

If a wet vapor is at 130°F and has a quality of 90%, its specific enthalpy is...

A.  1,015.8 Btu/lbm.

B.  1,019.8 Btu/lbm.

C.  1,117.8 Btu/lbm.

D.  1,215.8 Btu/lbm.

ANSWER:  A.

TOPIC:            193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:              P385

Given the following nuclear power plant conditions:

   Power  = 100%
   $T_{ave}$    = 573.5°F
   $T_{stm}$    = 513.5°F

Select the new steam pressure if 5% of the total steam generator tubes are plugged and the plant is returned to 100% power.  (Assume reactor coolant system mass flow rate and reactor coolant temperature are unchanged.)

A.  710.6 psia

B.  733.8 psia

C.  748.5 psia

D.  763.2 psia

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P474

Main condenser hotwell condensate is 4°F subcooled at a temperature of 112°F.  What is the condenser pressure?

A.  1.78 psia

B.  1.51 psia

C.  1.35 psia

D.  1.20 psia

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P1275

If steam pressure is 230 psia at a temperature of 900°F, what is the approximate amount of superheat?

A.  368°F

B.  393°F

C.  506°F

D.  535°F

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P1775   (B1776)

Which one of the following is the approximate amount of heat required to convert 3 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A.  888.6 Btu

B.  1119.2 Btu

C.  2665.8 Btu

D.  3357.6 Btu

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P1875

Saturated steam undergoes an ideal expansion process in an ideal turbine from 1000 psia to 28 inches Hg vacuum.  Approximately how much specific work is being performed by the turbine?

A.  1193 Btu/lbm

B.  805 Btu/lbm

C.  418 Btu/lbm

D.  388 Btu/lbm

ANSWER:  C.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:             P2275   (B2275)

$1.0 \times 10^6$ lbm/hr saturated steam at 30% steam quality is leaving a main turbine and entering a condenser at 2.0 psia.  Condensate is entering the hotwell at 118°F.

Which one of the following is the approximate condenser heat transfer rate?

A.  $3.1 \times 10^8$ Btu/hr

B.  $5.8 \times 10^8$ Btu/hr

C.  $7.2 \times 10^8$ Btu/hr

D.  $9.9 \times 10^8$ Btu/hr

ANSWER:  A.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:             P2375   (B2374)

Which one of the following is the approximate amount of heat required to convert 2.0 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A.  1119 Btu

B.  1187 Btu

C.  2238 Btu

D.  2374 Btu

ANSWER:  C.

TOPIC: 193003
KNOWLEDGE: K1.25 [3.3/3.4]
QID: P2475 (B2475)

A steam line is carrying steam at 500 psia and 507°F. Approximately how much ambient heat loss is required before moisture formation occurs in the steam line?

A. 31 Btu/lbm

B. 45 Btu/lbm

C. 58 Btu/lbm

D. 71 Btu/lbm

ANSWER: A.

TOPIC: 193003
KNOWLEDGE: K1.25 [3.3/3.4]
QID: P2575 (B2575)

Which one of the following is the approximate amount of heat required to convert 2.0 lbm of water at 100°F and 100 psia to a superheated vapor at 400°F and 100 psia?

A. 1119 Btu

B. 1159 Btu

C. 2238 Btu

D. 2318 Btu

ANSWER: D.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P2675   (B2675)

What is the specific heat (Btu/lbm-°F) of water at 300°F and 100 psia?

A.  1.025 Btu/lbm-°F

B.  1.125 Btu/lbm-°F

C.  1.175 Btu/lbm-°F

D.  1.250 Btu/lbm-°F

ANSWER: A.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:             P2775   (B2776)

With a nuclear power plant operating near rated power, air inleakage into the main condenser causes main condenser pressure to increase from 1.0 psia to 2.0 psia.

Given the following:

*   Initial main condenser condensate depression was 4°F.
*   After the plant stabilizes, with main condenser pressure at 2.0 psia, main condenser condensate depression is 2°F.

Which one of the following is the approximate increase in main condenser specific heat rejection needed to restore condensate depression to 4°F?

A.  2 Btu/lbm

B.  4 Btu/lbm

C.  8 Btu/lbm

D.  16 Btu/lbm

ANSWER: A.

TOPIC:            193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:              P2875

Given the following:

- A nuclear power plant is operating near rated power.
- The main turbine is comprised of a single unit with <u>no</u> reheat.
- Main turbine inlet steam conditions are 900 psia and 100% quality.
- Ideal steam expansion is occurring in the main turbine.
- Main condenser pressure is 1.0 psia.

Which one of the following is the approximate main condenser specific heat rejection needed to establish condensate depression at 4°F?

A.  716 Btu/lbm

B.  782 Btu/lbm

C.  856 Btu/lbm

D.  1132 Btu/lbm

ANSWER:  A.

TOPIC:           193003
KNOWLEDGE:  K1.25   [3.3/3.4]
QID:             P3074   (B3075)

The temperature of a saturated steam-water mixture is 467°F.

Which one of the following additional parameter values, when paired with the temperature, provides <u>insufficient</u> data to determine the approximate steam quality of the mixture?

A.  Pressure at 499.96 psia

B.  Enthalpy at 977.33 Btu/lbm

C.  Entropy at 1.17 Btu/lbm -°R

D.  Specific volume at 0.817 ft³/lbm

ANSWER:  A.

TOPIC:           193003
KNOWLEDGE:  K1.25   [3.3/3.4]
QID:             P3175   (B3175)

A steam line is carrying saturated steam vapor at 500 psia and 467°F.  Approximately how much specific heat addition to the steam vapor is necessary to achieve 60°F of superheat?

A.  31 Btu/lbm

B.  45 Btu/lbm

C.  58 Btu/lbm

D.  71 Btu/lbm

ANSWER:  B.

TOPIC:          193003
KNOWLEDGE:  K1.25   [3.3/3.4]
QID:              P3275   (B3274)

An ideal main turbine generator (MTG) is producing 1000 MW of electrical power while being supplied with 100% quality steam at 920 psig.  Steam supply pressure is then gradually increased to 980 psig at the same quality.  Assume turbine control valve position and condenser vacuum remain the same.

Which one of the following describes why the MTG output increases as steam pressure increases?

A.  Each lbm of steam entering the turbine has a higher specific heat.

B.  Each lbm of steam entering the turbine has a higher specific enthalpy.

C.  Each lbm of steam passing through the turbine expands to fill a greater volume.

D.  Each lbm of steam passing through the turbine performs increased work in the turbine.

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:  K1.25   [3.3/3.4]
QID:            P3475   (B3475)

Which one of the following is the approximate amount of heat required to convert 2 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A.  559.6 Btu

B.  1119.2 Btu

C.  2238.4 Btu

D.  3357.6 Btu

ANSWER: C.

TOPIC:            193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:              P3575

The following stable nuclear power plant conditions existed just prior to a plant shutdown for maintenance:

   Power     =  100%
   RCS $T_{ave}$  =  572°F
   SG $T_{stm}$   =  534°F

During the shutdown, 5% of the total steam generator (SG) tubes were plugged.  Which one of the following will be the approximate SG steam pressure when the plant is returned to 100% power?  (Assume RCS mass flow rate and RCS $T_{ave}$ are the same as their pre-shutdown 100% power values.)

A.  813 psia

B.  841 psia

C.  870 psia

D.  900 psia

ANSWER:  D.

TOPIC:          193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:            P3775   (B3774)

A 100 ft³ vessel contains a saturated water-steam mixture at 1,000 psia.  The water portion occupies
30 ft³ and the steam portion occupies the remaining 70 ft³.  What is the approximate total mass of the mixture in the vessel?

A.  1,547 lbm

B.  2,612 lbm

C.  3,310 lbm

D.  4,245 lbm

ANSWER:  A.

TOPIC:           193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:              P3875

A nuclear power plant has been operating at full power for six months when a sustained station blackout occurs, resulting in a reactor trip and a complete loss of forced reactor coolant circulation.  All means of reactor coolant injection are unavailable.  Reactor coolant system (RCS) pressure is being maintained at approximately 2,100 psia by operation of the pressurizer relief valves.

The following conditions exist five minutes after the reactor trip:

    RCS pressure:                              2,100 psia
    Core exit thermocouple (CET) temperature:   550°F

Assuming that core uncovery occurs within the next few hours, which one of the following describes the future response of the CET temperature indication?

A.  CET indication will remain stable at approximately 550°F until the core becomes uncovered; then, CET indication will become erratic.

B.  CET indication will remain stable at approximately 550°F until the core becomes uncovered; then, CET indication will increase to approximately 643°F where it will become erratic.

C.  CET indication will steadily increase to approximately 643°F and stabilize; then, as the core begins to uncover, CET indication will increase further until it becomes erratic.

D.  CET indication will steadily increase until it becomes erratic.

ANSWER: C.

TOPIC:              193003
KNOWLEDGE:   K1.25   [3.3/3.4]
QID:                  P3939   (B3938)

Main steam is being used to reheat high-pressure (HP) turbine exhaust in a moisture separator reheater (MSR).

Given:

- The HP turbine exhaust enters the MSR reheater section as saturated steam (100% quality).
- The exhaust enters and exits the reheater section at 280 psia and a flow rate of 1.0E6 lbm/hr.
- The main steam heat transfer rate in the reheater section is 42.1E6 Btu/hr.

Which one of the following is the approximate temperature of the HP turbine exhaust leaving the reheater section of the MSR?

A.  450°F

B.  475°F

C.  500°F

D.  525°F

ANSWER:  B.